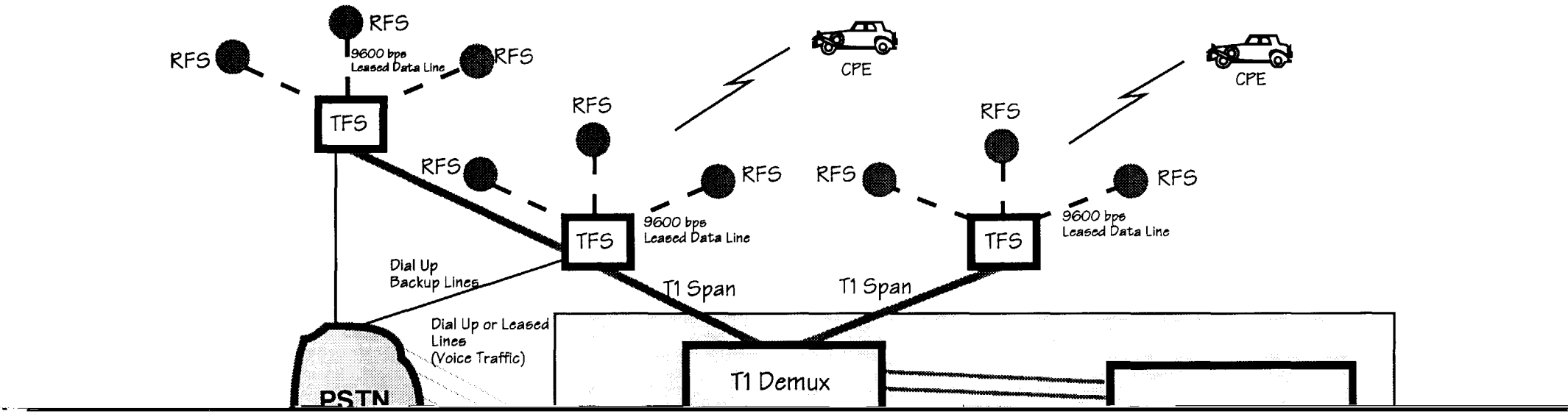
RFS
RFS
RFS
9600 bps
Leased Data Line
TFS
CPE
RFS
RFS
RFS
TFS
9600 bps
Leased Data Line
CPE
RFS
RFS
RFS
TFS
9600 bps
Leased Data Line
Dial Up
Backup Lines
T1 Span
T1 Span
Dial Up or Leased
Lines
(Voice Traffic)
PSTN
T1 Demux

For reasons discussed below, the system utilizes the full 8 MHz spectrum licensed under the interim rules and must protect that full spectrum from debilitating interference in order to provide the level of accurate radiolocation that the marketplace requires, as well as provide for adequate capacity and services for sufficient users to assure the economic viability of the business.

2. Need for Interference-Free Operation. Because the essence of wideband technology is to locate mobile units throughout a large area, system signals must travel long distances between the object being located and the system towers.[16] Interference to signal reception at one or more of towers can delay location, undermine system accuracy, or preclude location altogether.

Interference produces intolerable effects on wideband LMS systems as a result of the "near/far" problem, as described below. Even though wideband wide-area systems exhibit a degree of interference rejection, interference exists any time there are two signals operating on the same frequency. The "near/far" problem is defined by the fact that a strong (undesired) signal near a receiver will degrade and ultimately block the reception of a (desired) far signal as the interference rejection capability of the system is exhausted. For example, an

16 Typical distances between a mobile unit and fixed receive sites in a metropolitan area the size of Washington, D.C. are 10 to 12 miles. Of course, as MSA service areas are built out, the mean distances between towers will decrease as additional towers are added to accommodate increases in capacity and service range.

interfering signal source located one mile from a receiver will typically be received approximately ten times stronger than a desired signal source located two miles from the receiver.[17] In reality, the desired signal need not be much more distant than the undesired signal before the system's interference rejection capability is exhausted. Once the rejection capability is exhausted, the interference from sources which the licensee does not control cannot be overcome and would cause the system to fail.[18]

Thus the manner in which wideband wide-area systems are affected by destructive interference is not a technical deficiency. It is a result of the "near/far" problem -- an inescapable and immutable matter of physics. Earlier statements by proponents of narrowband local-area systems touting their systems and denigrating wideband pulse-ranging technology, ignore this fact. Their claims that wideband LMS systems do not interfere with narrowband systems and their arguments that wideband systems should be similarly resistant to interference are misplaced, since narrowband local area systems do not suffer

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17 See Technical Appendix, Section III.

18 As discussed below, in any given location there will always be a certain level of uncontrolled interference from other authorized users of the 902-928 MHz band. This interference uses up the interference rejection capability of the wideband system and makes it all the more essential that interference from additional sources be curtailed. See Technical Appendix, at 11; see also the Petition for Rulemaking of North American Teletrac and Location Technologies, Inc. ("Teletrac Petition"), filed on May 26, 1992, Appendix 2; Comments of MobileVision in support of the Teletrac Petition, filed July 23, 1992, Appendix A.

from "near/far" problems in their operating context.[19] Moreover, the argument fails to acknowledge the fundamental differences between narrowband local-area systems and wideband wide-area systems and the fact that each system employs different technology, each has different limitations and each provides different services at contrasting levels of sophistication.

The capabilities and services that the MobileVision system can offer to the consumer and commercial user will not be available if that system is subjected to excessive levels of interference. Notwithstanding the fact that MobileVision's LMS system overcomes reasonable levels of interference, any co-frequency device or signal within the 8 MHz bandwidth set aside for wideband LMS operations will interfere with those operations. All interference degrades the system, whether the source of the interference is a narrowband or wideband device or signal. Certain sources, such as narrowband LMS providers, typically generate interference at levels that degrade the performance of any wideband LMS system to an unacceptable level and render such systems inoperable or so corrupt the signal that the location services become sufficiently inaccurate as to render the systems unusable.

3. Source of Interference. The sources of interference currently experienced by wideband pulse-ranging LMS

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19 Since tag reader systems read one object at a time and operate at a maximum of 500 feet, the "near/far" problem does not arise. Indeed, in the event a narrowband system were to attempt to provide service over a wide area, it would experience significantly worse "near/far" problems than those experienced by wideband systems.

systems are amateur radio operators, wireless local area networks ("LANs"), anti-shoplifting clothing tags and narrowband LMS systems, e.g., toll booth operators. Generally, the LANs and clothing tag operators ("Part 15 Users") use spread spectrum technology, while the toll booth and amateur radio operators may appear as high power narrowband interference.

Presently, no actual interference is experienced from co-channel wideband LMS operators (i.e., two users on the same frequency band in the same geographic area) because no market has experienced the simultaneous operations of two co-channel wideband LMS service providers. However, such operations would present a serious problem because the interference that they would create is impossible to eliminate.

LMS operations can cause self-induced interference as well. MobileVision controls this self-induced interference using a complex combination of techniques that control the allocated spectrum and that are designed to maximize system capacity and preserve the accuracy of the location function. Ranging accuracy is achieved by using the highest chipping rate consistent with

independent co-channel operators are present in the same 8 MHz band.[21]

4. Effects of Interference. Interference to the narrowband transmissions of a wideband LMS system (i.e., the initial communications between a mobile unit and the TFS, including the use of the forward link) can essentially render the system inoperable. For instance, if, at the time a vehicular mobile unit is transmitting on the narrowband channel to the TFS to indicate that the vehicle is in distress, a more powerful narrowband signal from another operator, such as a tag reader or another forward link of a LMS wideband system, drowns out the mobile unit's signal at the receiver, the TFS may not detect the distress signal. To alleviate any such problem on a recurring basis, the system would have to allocate significant time resources. While the MobileVision system does have built-in design features that require the mobile unit to re-send on a repetitive basis until it is able to establish contact, the use of this feature on a frequent basis will considerably reduce system capacity by diverting the system's available resources. An environment that requires extensive use of the system's capacity to fully protect against interference, in order to achieve the highest probability that the distress signals will be received precisely, would also prohibitively increase costs and render the system commercially non-viable.

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21 See Technical Appendix, Section IV.

Interference to the wideband pulse-ranging signals presents no less of a concern. While interference to the narrowband communications threatens an LMS system by destroying vital setup and command signals, interference to the wideband pulse-ranging signals severely reduces the accuracy with which an LMS system locates mobile units. Spread spectrum technology may be used for both communications and location purposes. When the technology is employed for a communications purpose, power control of the signal must be employed in order to permit CDMA techniques to assure receipt by the intended site of the content of the communications. In such a communications system, interference can be mitigated in large degree by techniques such as forward error correction. When the primary purpose of the system is wide-area location, however, the focus is on the measurement of time of arrival of the spread spectrum signal at multiple sites. In such an application, power control is unavailable and interference has different and more critical effects.[22]

As noted above, the multilateration technique of locating mobile units involves wideband signals transmitted by a mobile unit that are received at multiple RFS and TFS sites, and the time difference between each time of arrival at the receive

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22 CDMA is feasible only when power control techniques can adjust the signal strength from multiple services to be received at the same power level at a single site. Such power control techniques cannot be used when multiple transmitters at different locations and distances must be received by a cluster of five or six sites as in a wideband LMS system. See Technical Appendix, Section IV.

sites determines the location of the unit. In theory, the intersection of the lines of position "drawn" around each receive site is a single point in space. To a degree, the greater the number of sites receiving the wideband signal, and therefore, the greater the number of lines of position used in determining the location, the greater the accuracy of the determination. MobileVision believes that, with the level of interference that exists in the primarily metropolitan areas where LMS systems must be able to operate, a minimum of five receive sites must independently receive the wideband pulse-ranging signal to make an accurate calculation of a unit's location. Use of less than five receiving sites in an urban environment can cause severe degradation of accuracy.[23]

Noise and interference, however, corrupt the receipt of the wideband signal so that its time of arrival is distorted and the intersection of the lines of position becomes a region and not a point. If receipt of the wideband signal is sufficiently corrupted by co-channel interference, the calculated time of arrival is not useable for purposes of locating the unit and the data is discarded. A reduction in the number of RFSs or TFSs involved in the determination of a unit's location as a result of unusable signals reduces the accuracy of that determination. Thus, interference to the wideband pulse-ranging signal does not interrupt the signal, but it can corrupt its receipt sufficiently to make determining the signal's time of arrival impossible.

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23 Technical Appendix, Section II.

For example, location accuracy will be affected when two mobile units, one from each LMS system both on the same frequency, are transmitting either narrowband or wideband signals while in the same proximate area. Vehicle interference is not presently a problem for operating AVM systems because thus far no two AVM systems are operating on the same 8 MHz band in any particular geographic area. However, if two AVM systems are licensed in the same 8 MHz band in the same geographic area, and both licensees buildout and commence operations, neither will be able to provide beneficial services to the public due to interference from the other.

In sum, interference from co-channel LMS systems in the same geographic area operating on the same 8 MHz band in the same area would create unacceptable interference to both the wideband pulse and narrowband communications which are essential to the operation of the system. Co-channel LMS operations would corrupt the wideband pulse signals and confuse the control functions of the other LMS system.

II. DISCUSSION

A. Allotment and Licensing on Separate Spectrum for Narrowband LMS Systems is Essential for Interference-Free Operation by Wideband LMS Systems.

The Commission proposes to divide the 902-928 MHz band into five sub-bands reserving 902-904, 912-918 and 926-928 MHz for narrowband systems while allotting 904-912 and 918-926 MHz

for wideband use.[24] MobileVision fully supports the Commission's proposed allotment scheme.[25] For the reasons set forth in detail in the preceding section and in our Technical Appendix, narrowband LMS systems should not be licensed in the same frequency bands as wideband pulse-ranging systems due to the interference that the narrowband systems cause to wideband operations.[26]

Based on the record generated in connection with Teletrac's Petition, the Commission correctly concludes that "co-channel noise in the vicinity of a wideband pulse ranging system ... make[s] it difficult, if not impossible, for the system to operate effectively." Notice at ¶ 14. The Commission also notes appropriately that while it is theoretically possible to overcome "a limited increase in co-channel noise," the means for doing so

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24 As indicated above at pp. 8-9, the interim rules only provided for narrowband use at 903-904 MHz and 926-927 MHz and, even then, on a developmental basis. Licensing since 1974 of such users in either the 904-912 MHz or 918-926 MHz bands has been in error. The NPRM, therefore, has expanded the permissible band for narrowband users, such as tag readers, by 8 MHz of spectrum.

25 The proper functioning of the proposed allotment scheme requires sufficient channel rejection of the adjacent narrowband users, as provided for in the out-of-band emissions requirements proposed in the Notice.

26 The earlier record in this proceeding documented specific cases of such interference. See e.g., Reply Comments of North American Teletrac and Location Technologies in Support of Petition for Rulemaking at 22 ¶ 35, More recently, in its Application for Review of the Commission's grant of various tag reader applications, Teletrac has cited the difficulties it has encountered in resolving cases of interference with such systems. Affidavit of John L. Piechota, Appendix F to North American Teletrac and Location Technologies, Inc.'s Application for Review, In the Matter of B.P. Oil Company, et. al, filed May 25, 1993.

are "generally not reasonable or cost-effective." *Id.* MobileVision wholeheartedly concurs in this view, see, pp. 21-28, supra. Specifically, MobileVision opposes any licensing scheme that would require frequency sharing between wideband and narrowband LMS systems. As discussed below, wideband systems require a full 8 MHz of spectrum in order to achieve the accuracy, capacity and diversity-of-service objectives necessary to successful commercial and technical operation and to meet the out-of-band emission requirements proposed in the Notice. See pp. 36-40, infra.

Both the accuracy and the capacity of wideband systems relate directly to occupied bandwidth. The latter is defined in large part by the chipping rate employed by the system. Maintaining maximum capacity on the system so as to serve the greatest number of subscribers demands that location bursts be kept as short as possible. Accuracy also is directly (but not solely) proportional to the chipping rate for the spread spectrum signals.[27] Existing systems (e.g., Teletrac and MobileVision) are using chipping rates of 2 Megachips per second which, at location accuracies within 100 feet, result in occupying bandwidth of 4 MHz in the major lobe and two secondary lobes of 2 MHz each containing significant energy. Cost effective methods

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27 See Technical Appendix, Section I. A provider can maintain a highly accurate system at a lower chipping rate by utilizing a long signal burst but the resulting diminution in capacity will negate its ability to provide the variety of services to a sufficient number of subscribers in a market area to either serve the public interest or create a commercially viable system.

for removing the secondary spread spectrum lobes are simply not available in order to permit use by other providers. Even if it were possible, the reduced spectrum would make it impossible to offer sufficiently diverse services to survive in the marketplace.[28]

One possible method by which narrowband and wideband systems could share the same frequency is to require wideband systems to sense the presence of a noise signal before transmitting, i.e., Carrier Sense Multiple Access ("CSMA"). This is the basis of IEEE 802.3 Local Area Networks ("LANS"). This method is impractical, however, due to the difficulty of detecting a noise-like signal which only lasts for tens of milliseconds.[29]

Time sharing of frequencies using TDMA protocols is also fraught with many problems. Maintaining any sort of time synchronization among several providers at the level of accuracy necessary for commercially viable location finding would be extremely difficult, if not impossible. Asynchronous requests, such as a stolen vehicle alert or an emergency roadside service transmission, cannot be practicably sequenced into a TDMA scheme. As explained above, control of the spectrum utilized by the

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28 *Id.*

29 Affidavit of Charles L. Jackson ("Jackson Affidavit"), filed as an attachment to Teletrac's Reply to Pinpoint's Opposition to Teletrac's Petition to Deny with regard to various Pinpoint applications, filed April 8, 1993, at ¶¶ 14-15.

system must remain with the wideband system operator to a degree that renders sharing with narrowband systems impossible.[30]

MobileVision concurs in the general licensing proposal of the Commission with regard to narrowband licensees with one exception. Based on the flexibility that tag reader licensees have espoused in prior Commission filings and MobileVision's understanding of the technology, MobileVision believes that the migration (re-licensing) of these systems to the properly allocated spectrum should occur no later than six months following the effective date of the Report and Order in this proceeding.

B. The Commission Should Adopt Its Proposal to Impose Co-Channel Separations on Licensing of Wideband LMS Systems for a Period of Five Years.

The Commission proposes that licensing in the 904-912 and 918-926 MHz band be reserved for pulse-ranging LMS systems of at least two megahertz on a "shared" (i.e., non-exclusive) basis. Notice at ¶¶ 18-22. The Commission outlines two approaches to licensing within the bands "assuming that sharing of this spectrum is feasible" and requests comments on its proposals and invites alternatives that would better serve the public interest. Specifically, the Commission proposes to begin licensing wideband systems on a shared basis immediately, if such sharing is shown to be feasible, or, in the alternative, "to protect licensees that are currently authorized in the 904-912 and 918-926 MHz band

30 See Technical Appendix, Section IV; Jackson Affidavit at ¶¶ 17-21.

. . . for a period of five years" by adopting 110-mile co-channel separation limits on any system authorized in these bands during the five year period following adoption of a Report and Order in this proceeding.

Because it cannot be shown that sharing is feasible at the present time, MobileVision supports adoption of the Commission's proposal to defer sharing of the wideband spectrum for a period of five years. It recommends that the proposal be modified to accommodate situations where co-channel licensees currently exist in a market, and that it be coupled with a five year buildout requirement for existing license holders, with reporting benchmarks to assure timely completion of construction and commencement of service. (MobileVision's proposal as to the five-year buildout is more fully discussed below in the section dealing with construction periods.) MobileVision opposes the Commission's plan to permit LMS systems that use less than 8 MHz to be licensed on the wideband spectrum. Since its comments on these proposals are interrelated, they are presented here together.

Prior discussion makes clear that wideband pulse-ranging systems are capable of providing accurate service to subscribers only in an environment free of disruptive interference. There are no techniques or accommodations that currently exist or that are technically feasible that would permit two wideband users to transmit over the same frequency band and still provide the service intended to be secured for the public by this proceeding. The various access sharing

techniques -- TDMA and FDMA -- are not suitable to the purpose of such sharing.[31] Nor are sufficient filtering techniques available at a cost, both economically and technically, that would permit the licensee to provide service in an effective manner.[32] There is simply no technical or experiential basis upon which it may be concluded that co-channel sharing of the wideband LMS spectrum is "*immediately* feasible." Notice at ¶ 22 (emphasis in the original). Therefore, MobileVision strongly urges the adoption of the Commission's alternative proposal to set aside a period of five years during which such sharing is deferred, following which co-channel licensing will be permitted only on the basis that a second licensee must demonstrate that its operation will not interfere with existing licensed service. Such a plan will assure that those who have to date invested time, effort and massive financial resources in developing, testing, deploying and operating wideband pulse-ranging LMS systems and bringing diverse and innovative new services to the public will continue to be able to do so. Concurrently, it will allow others who have just begun to develop and prove out their systems an opportunity to complete the process.

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31 As noted above, these techniques are useful to an operator with full control of the band, and with discretion to decide upon the timing and method of their use, in avoiding self-generated interference and in achieving better spectral efficiency, broader services and increased capacity.

32 The description of the effects of wideband interference on another wideband system is contained at pp. 26-28, supra. The Technical Appendix sets forth the basis for that description as well as the futility or prohibitive cost effects (technical and economic) of normally applied sharing techniques, Sections I and IV.

It may be noted that recent would-be entrants to "wideband" LMS service have proposed various access sharing techniques in various applications or other filings with the Commission over the past year or so. To date, however, none of these potential entrants to the field can point to its own experimental, test or operational experience or data to substantiate its claims that sharing is feasible. MobileVision will discuss any such claims or showings made in connection with the NPRM in its Reply Comments (assuming the participation of such entrants in this proceeding).

Deferring shared licensing temporarily will not result in higher costs and detrimental decreased competition, as the Commission has posited might happen were it to license wideband LMS systems on an exclusive basis. MobileVision believes that such concerns will not be realized and is convinced that band sharing at the present time will have the exact opposite cost effects from those anticipated by the Commission. As detailed below (pp. 38-40), decreased aggregate capacity and the necessary additional filtering and other band sharing techniques required as a result of sharing would increase costs to the provider, and, thus, ultimately to the consumer. In addition, competitors for market share of location and ancillary services already exist in a variety of different technologies and will continue to provide healthy market pressures that will maintain affordable pricing and encourage, indeed mandate, improvements in flexible and innovative services. By adopting its alternate licensing proposal, which recognizes the need to protect systems

from debilitating co-channel interference, the Commission will assure that important, needed, new services become available to the public expeditiously from LMS licensees employing high-capacity wide-area wideband systems, thereby immediately fostering further competition in those service sectors.

The new rule, however, must take into account the fact that in certain markets, more than one licensee currently holds authorizations for wideband LMS systems. This is true in the 918-926 MHz band where MobileVision and at least one other entity are currently licensed. In these markets, MobileVision proposes the Commission adopt an approach akin to that which will become effective at the end of the five year deferral period. Thus any licensee building out in a market pursuant to a valid authorization, must be required to protect any previously-constructed and operating co-channel system in the same market. Such an approach is consistent with the Commission's objectives in this proceeding.

In the Notice the Commission proposes to include in the definition of "wideband" systems those operating with less than 8 MHz of spectrum. MobileVision maintains, that the provision of LMS service contemplated in this rulemaking on a wideband system requires that service to utilize the full 8 MHz spectrum allocated for that purpose. A division of the spectrum into licenses for 2 MHz or 4 MHz bands would have a number of critically detrimental consequences: it would degrade significantly the accuracy of the core radiolocation service; significantly diminish the aggregate service capacity of the

spectrum; reduce (or eliminate) the ability of a provider to offer satisfactory ancillary communication features; and increase dramatically the cost of preventing interference with adjacent providers.

One of the principal determinants of location accuracy in any wideband pulse-ranging spread spectrum system is the chipping rate. The chipping rate currently employed by MobileVision -- and which is the primary factor in its ability to locate an object to within less than 100 feet -- generates a primary lobe over the spectrum of 4 MHz and two secondary lobes of 2 MHz each. To operate on less than the 8 MHz allocated would theoretically require either (a) a reduction in chipping rate -- in half, for example, to achieve operation over 4 MHz or to one-quarter of the current rate to achieve operation over 2 MHz or (b) sufficient filtering to eliminate propagation beyond the primary lobe. (A reduction to 2 MHz of operation would require a reduction in chipping rate even with filtering.) However, such changes are not feasible. As discussed, any reduction in chipping rate adversely affects either location accuracy or system capacity or both. For example, halving the chipping would reduce system capacity proportionately if accuracy were maintained at 100 feet. Filtering of the magnitude required, even if technically achievable (which is highly doubtful), would be cost prohibitive.[33]

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33 See Technical Appendix, Sections I and IV.

Aside from the technical impediments to spectrum splitting, the marketing studies and economic models indicate that the full capacity of the system to provide radiolocation and its ancillary services is necessary to reach market penetration and generate sufficient subscription revenues to secure economic viability and justify the necessary capital infrastructure investment. The marketplace, according to market research studies, is only minimally interested in receiving stand alone

today (or will be provided soon) by dead reckoning, global positioning, SMR and cellular technologies. In every major marketplace, there should be competition from a variety of current and potential suppliers, including two providers of wideband LMS systems.

Cost to the user, also indicated as a potential concern of the Commission, will increase, rather than decrease, in a less-than-8-MHz-bandwidth environment. Putting aside the efficacy of filtering or other techniques for protecting the adjacent bandwidths within a split spectrum, overall capacity will diminish and infrastructure and operating costs will increase if there is a division of the 8 MHz bandwidth among providers. The result will be a higher per user cost. Moreover, wideband LMS already exists at an affordable price to the user -- subscription rates for basic radiolocation services currently approximate $10 a month.[35] As noted earlier, the market studies indicate a demand for bundled or packaged services at package rates in preference to single service subscription. They also indicate that, based on pricing levels currently offered, such bundled services should result in sufficient market penetration to permit an economically viable system but only if a provider has unrestricted access on the spectrum to the capacity and the flexibility necessary to permit a wide offering of such packaged services. Clearly, issues regarding the cost to the public mandate the need for co-channels of 8 MHz, sufficiently protected

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35 Therefore sufficient capacity must be maintained to serve millions of users in order to remain economically viable.

from interference, to preserve that needed capacity and flexibility.

In sum, the licensing scheme which MobileVision supports -- interference protection for wideband systems utilizing the full 8 MHz bandwidth -- will limit the number of wideband, pulse-ranging services in each market until such time and unless it can be demonstrated that additional service providers can co-exist on a non-interfering basis on the same frequencies. The impact on entry in the bands allocated for such services, however, will not be to the public's detriment as the consumer will be assured, as a result, of a truly competitive

deploying the type of extensive infrastructure required for an LMS system of appropriate scope and scale to effectively serve a market. Indeed, the only voices to be heard today seeking to provide wideband location services are those who would do so on a commercial private carrier basis. Licensing in that manner will assure that service is provided to the greatest number of consumers.

Likewise, MobileVision concurs in the Commission's finding that there is a growing demand by all segments of society for the services provided by LMS systems, both wideband and narrowband. Indeed many of the services, such as stolen car recovery and emergency medical and roadside service, are ideally suited to meet the needs of individual consumers and the very viability of the service as a commercial enterprise dictates that the market include the broadest possible customer base.

This expanded universe of end users will not create a

> of such units. LMS systems may also transmit and receive status and instructional messages related to the units involved.

Notice at ¶ 9. MobileVision fully supports the Commission's proposed definition and the flexibility it creates for LMS licensees to provide location services for all animate and inanimate objects.[36] The proposed definition is consistent with MobileVision's system in that MobileVision uses non-voice signalling for purposes of location and provides related status and instructional messages. These ancillary messages, which are essential to the efficient provision of LMS services, may be used, for example, to further identify the status of the located objects, the type of distress situation in which the object may be involved, or vital routing information.

Furthermore, the proposed definition correctly expands the scope of LMS systems beyond vehicles. The ability to broaden the scope of LMS systems beyond merely vehicles is beneficial to the public needs and is necessary to the financial health of LMS systems because it broadens their customer base and allows such systems to spread their costs and reduce the prices charged to LMS customers.

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[36] MobileVision's suggestion in its Comments on the Teletrac Petition to delete the second sentence of the definition was not a comment on the substance of the definition and the services which LMS systems should be able to provide, but was a technical comment concerning only the structure of the proposed rule and the redundancy of the definition and the authorization in § 90.239. Since the latter section is proposed to be deleted, the redundancy no longer would occur. Implicit in that proposed deletion is the recognition that the authorization of related communication means is inherent in the LMS definition, a recognition that was central to MobileVision's earlier suggestion.

In the Notice, the Commission expressed a caution that the expansion of end user eligibles, eligible licensees and permissible uses might, in combination with expanded eligibility of licensees and end users, create congestion in the spectrum in which LMS systems are licensed and requested comment on that possibility. If the Commission adopts its proposed licensing scheme for narrowband systems and licenses wideband LMS systems for the full 8 MHz bandwidth, thus providing for the full capacity available on the allocated spectrum, MobileVision does not foresee such congestion problems. In such a licensing environment, wideband location systems are capable today of accommodating millions of subscriber units per market. Taking into account the existing number of competitors in this and other technologies in the marketplace, it is not anticipated that congestion will occur as a result of expanded uses of the LMS spectrum, but only that the public will be better served through increased services and service providers.

E. The Commission Should Allocate the Forward Link in the Same Frequency Band as It Allocates the Wideband LMS System.

In its NPRM, the Commission proposed to continue authorizing wideband LMS systems to operate a forward link in the alternate 8 MHz band. Specifically, the Commission proposed allowing LMS systems in the 904-912 MHz band to operate a 250 kHz forward link at 924.890-925.140 MHz and LMS systems in the 918-926 MHz band to operate a forward link at 904.375-904.625 MHz. Furthermore, the Commission stated that the forward links could

only be used in conjunction with units being located and that no other restrictions should apply to the forward link.

MobileVision concurs that the only requirement placed on operation of the forward link should be that its use is restricted to the unit being located. However, while it recognizes that the Commission's proposal to locate the link in the "other" 8 MHz spectrum is consistent with the current allocation under the interim rules, MobileVision supports locating the forward link for a particular LMS system in that system's licensed 8 MHz band.

Special filtering and other methods are required to filter out the forward link of the other wideband LMS system in a particular market, and these filtering methods pose a significant expense and technical difficulties. MobileVision has developed less costly methods to utilize narrowband signals within its own 8 MHz band to perform the functions of the forward link, while greatly minimizing the technical interference problems. Such methods are most effective when the link being filtered is within the bandwidth controlled by the user.

MobileVision recognizes that Teletrac, as presently authorized, operates forward links in frequency bands now licensed to MobileVision. MobileVision is willing to accommodate Teletrac and any other similarly situated parties during some type of transition period during which Teletrac and others may relocate their forward links to their own 8 MHz bands.